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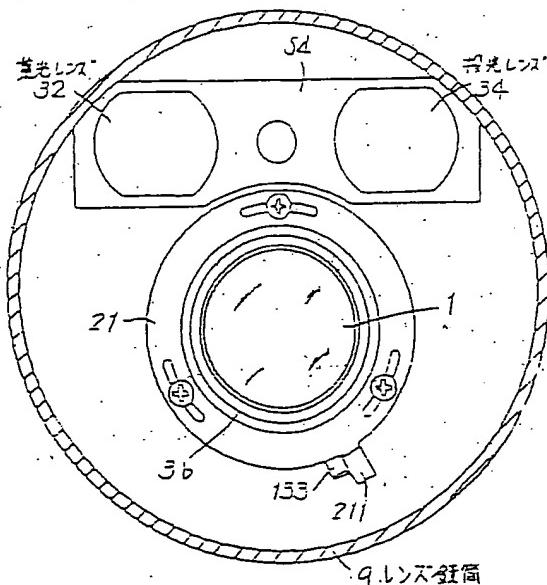
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(54) [発明の名称] カメラ

(57) [要約]

【目的】 レンズ鏡筒の大型化を防止しつつ鏡筒内収納部品の収納に必要なスペースをレンズ鏡筒内に確保しC、カメラボディの小型化を図る。

【構成】撮影レンズ1の光軸に沿って進退可能なレンズ鏡筒9を有するカメラにおいて、レンズ鏡筒9の進退方向に延びる中心軸を撮影レンズ1の光軸に対して偏心させる。偏心により拡大したスペースに例えば測距光学系30などの鏡筒内収納部品を収納する。



〔特許請求の範囲〕

〔請求項1〕 撮影レンズの光軸に沿って進退可能なレンズ鏡筒を有するカメラにおいて、前記レンズ鏡筒の進退方向に延びる中心軸を前記撮影レンズの光軸に対して偏心させたことを特徴とするカメラ。

〔発明の詳細な説明〕

〔0001〕

〔産業上の利用分野〕 本発明は、撮影レンズの光軸方向へ進退可能なレンズ鏡筒を備えたカメラに関する。

〔0002〕

〔従来の技術〕 従来この種のカメラとしては、カメラボディに対するレンズ鏡筒の出し巻きを変化させて撮影レンズの焦点距離を変更する可変焦点カメラが知られている。この可変焦点カメラにおいては、撮影レンズの光軸とレンズ鏡筒の中心軸とが一致するようにこれらの配置が定められ、撮影レンズの外周とレンズ鏡筒の内周面との間の隙間に、絞り環シヤッタや焦点調整機構のアーチュエータなどの鏡筒内収納部品が収納される。

〔0003〕

〔発明が解決しようとする課題〕 上述したカメラでは、鏡筒内収納部品の収納スペースを拡大するためにはレンズ鏡筒を大型化せざるを得ないところ、鏡筒内収納部品は撮影レンズの外周上の特定箇所に偏って配置されるため、一部の鏡筒内収納部品のためにレンズ鏡筒が大型化して鏡筒内収納部品の入らない位置では大きな無駄スペースが生じることになる。レンズ鏡筒が大型化すれば、これを撮影レンズの光軸方向へ進退させるための駆動機構の大型化も避けられず、カメラボディの小型化を図る上で大きな障害となる。

〔0004〕

例を説明する。図1～図4は本発明の一実施例を示す。レンズ鏡筒部分の縦断面を示す図1において、3群構成の主レンズ1は外周面にヘリコイドねじ3aが刻設された保持筒3に保持され、その保持筒3がシャック基盤5のヘリコイド51に締合されている。シャック基盤5には主レンズ1の後方部分52でシャック7が保持され、主レンズ1の上方の保持体53に後述の測距光学系30が設けられている。

〔0009〕 円筒状のレンズ鏡筒9内にはシャック基盤5がそれと一緒に固定され、レンズ鏡筒9の外周に刻設されたヘリコイドねじ91が、レンズ鏡筒9の外周に設けられた鏡筒送り筒11のヘリコイドねじ111と締合し、レンズ鏡筒9それ自身は、図示しないカメラボディに立設された回転阻止部材によりその回転が阻止され、かつ、光軸方向の移動は自由とされ、従って、鏡筒送り筒11が回転するとそれに応じてレンズ鏡筒9が光軸に沿って移動する。すなわち、短焦点撮影時の送達位置

(図1)と長焦点撮影時の突出位置(図2)との間で移動する。なお、10はカバーを示す。

〔0010〕 また、保持筒3が締合されたシャック基盤5の円筒部54には主レンズ1の光軸を中心に回動可能に運動リング13が外挿されている。図4に示すとおり、運動リング13に形成されたギア131と啮合するギア151を有するモータ15がシャック基盤5に保持されている。更に、運動リング13には円筒カム132が運設されている。

〔0011〕 図4において、回動中心O1を中心に回動可能とされたレバー17のカムフロア171がカム132に当接保合されている。レバー17の他端にはピン172が立設され、回動中心O2を中心として回動可能とされたレバー19の保合部191がピン172と保合されている。ここで、運動リング13、モータ15、レバー17、19が走査手段40を構成する。また、運動リング13はカメラ前方に立設された保合腕133を有し、図3に示すとおり、保持筒3の前面3bに螺着されたバック調整リング21の保合腕211と保合し、モータ15の回転が運動リング13を介して保持筒3に伝達される。運動リング13、モータ15、バック調整リング21が撮影光学系の駆動手段50を構成する。

〔0012〕 図1および図4に示すように、測距光学系30は、シャック基盤5に固定保持された受光素子31と、受光素子31上に後述の反射光を集光する集光レンズ32と、レバー19の一端に固定された発光素子33と、発光素子33からの出射光を被写体に向けて射出する投光レンズ34とを有する。図3に示すように、集光レンズ32および投光レンズ34はそれぞれの周縁に互いに並行な一对の切欠部32a、34aを備える。これら切欠部32a、34aを設けたことにより、保持体53が小型化されてレンズ鏡筒9の大口径化が抑制される。

〔実施例〕 以下、図1～図4を参照して本発明の一実施例

3

光レンズ34とともに円形に並んでいる。

[0013] また、図1および図3から明らかかなよう
に、三レンズ1はその光軸をレンズ鏡筒9の中心軸より
も下方へ偏心させて取り付けられている。これにより、
レンズ鏡筒9の大口径化を防ぎつつ測距光学系30の収納
スペースを拡大できる。そして、受光素子31と発光素子3
3は自動焦点検出回路41と接続され、発光素子3
3は変調光を発光するように制御され、受光素子31の
出力信号に基づいて測距が行なわれる。その検出回路4
1は演算処理装置(以下、CPU)42と接続され、CPU
42にはモータ駆動回路43が後続されてモータ1
5が制御される。なお、これら検出回路41、CPU4
2、モータ駆動回路43等の電気要素もシャック基盤5
に一体に保持されている。

[0014] このように構成された実施例の動作を説明
する。短焦点撮影では、図1に示すとおりレンズ鏡筒9
が鏡筒送り筒11内に退避した位置にあり、三レンズ1
はより焦点距離が定められる。図示しないシャック鉤が
上り焦点距離が定められるとCPU42からの指令によりモータ駆動
半押しされるとCPU42からの指令によりモータ駆動
回路43が働いてモータ15が回転を始めるとともに検
出回路41により発光素子33が変調光を発する。図
に示すと、モータ15が反時計方向に回転すると運動
リング13が時計方向に回転しレバー17が反時計方
向に回動する。レバー17に連動してレバー19が時計方
向に回動すると発光素子33も時計方向に回動し、投光
レンズ34を介して変調光により被写体が走査される。
そして、モータ15の回転は保持筒21を介
して、モータ15の回転は保持筒21が回転
してバック調整リング21に伝達されて保持筒3が回転
し、これにより三レンズ1がシャック基盤5に対して保
持筒3が回転する。

[0015] 被写体に照射された変調光は反射し集光レ
ンズ32を介して二分割受光素子31に入射する。一对
の受光素子31からの各出力は検出回路41に入力され
る。各受光素子31の出力が一
瞬間の信号処理が施され、各受光素子31の出力が一
致した点を合焦位置と判別してCPU42に判別信号が
出力される。次いで、CPU42からモータ駆動回路43に
モータ停止信号が出力され、モータ15が停止される。
これにより、保持筒3の繰り出しが止まり三レンズ1は
被写体までの距離に応じた位置に制御されて合焦する。

[0016] 次に、図示していない駆動手段により鏡筒
送り筒11が回転するレンズ鏡筒9が光軸に沿ってカメラ
前方に突出するどもに、三レンズ1の後方光軸に副
レンズ23が挿入され、図2に示すようになって長焦点
レンズ鏡筒9が可能となる。図2からわかるように、レンズ鏡
筒9の突出とともに撮影光学系を構成する三レンズ1、
測距光学系30、走査手段40、モータ15を含む駆動
手段50が一体に前進するので、これら各要素、系の各
手段50が一体に前進するので、これら各要素、系の各

対位置関係は変わらない。長焦点撮影の場合も短焦点撮
影と同様にして測距、焦点調節が行なわれる。短焦点撮
影、長焦点撮影いずれの場合でも撮影距離に対する三レ
ンズ1の繰り出し量は同じになるよう光学設計されてい
る。その結果、同一カムが使える。

[0017] 以上説明したように、本実施例ではレンズ
鏡筒9の偏心により測距光学系30を収納するに必要な
スペースをレンズ鏡筒9内に需んでいるので、レンズ鏡筒
9と三レンズ1とを同軸にする従来例と比較してレンズ
鏡筒9が小型化される。この結果、レンズ鏡筒9を三レ
ンズ1の光軸方向へ進退させるための機構も小型化さ
れ、ひいてはカメラボディの小型化も可能となる。

[0018] 実施例では三レンズ1の光軸とレンズ鏡筒
9の中心軸との偏心に伴って拡大したスペースに測距光
学系30を収納したが、本発明はこれに限るものではない
。測距光学系30をレンズ鏡筒9に収納しない場合
は、これに代えて他の鏡筒内収納部品、例えばシャック
基盤5を偏心で拡大したスペースに収納してもよい。二
焦点カメラに限らず、単焦点カメラや三焦点以上のカメ
ラでもレンズ鏡筒が進退する限り本発明を適用できる。

[0019]

[発明の効果] 以上説明したように、本発明では、レン
ズ鏡筒の中心軸を撮影レンズの光軸に対して偏心させた
ので、レンズ鏡筒の大型化を防止しつつ鏡筒内収納部品
の収納に必要なスペースをレンズ鏡筒内に確保して、カ
メラボディの小型化を図ることができる。

[図面の簡単な説明]

[図1] 本発明の一実施例のカメラの短焦点時における
レンズ鏡筒前部の縦断面図。

[図2] 本発明の一実施例のカメラの長焦点時における
レンズ鏡筒前部の縦断面図。

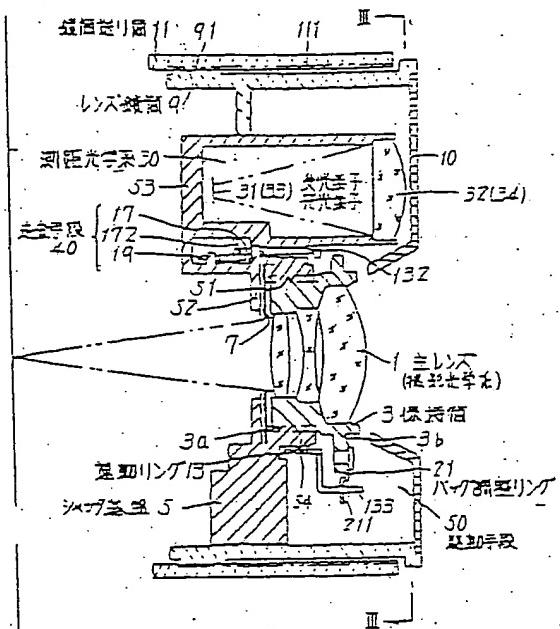
[図3] 図1のIII-III線から見た正面図。

[図4] 測距光学系30周辺の図であり、焦点検出制御
系のブロック図を含む図である。

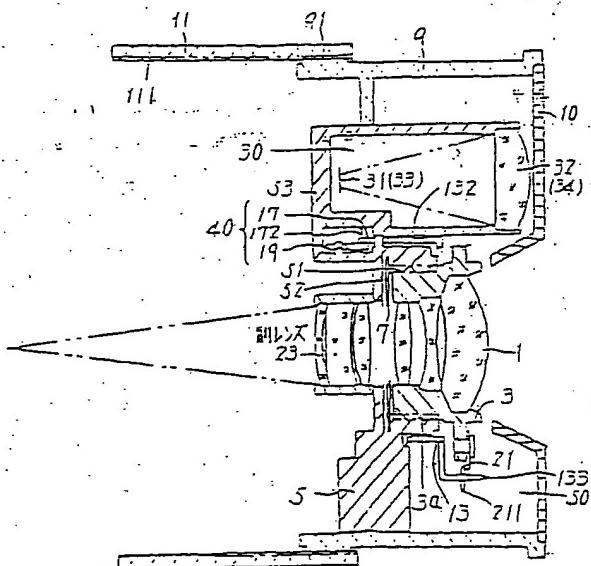
[符号の説明]

- | | |
|----|-----------|
| 1 | 三レンズ |
| 3 | 保持筒 |
| 5 | シャック基盤 |
| 9 | レンズ鏡筒 |
| 11 | 鏡筒送り筒 |
| 13 | 運動リング |
| 21 | シャック調整リング |
| 30 | 測距光学系 |
| 31 | 受光素子 |
| 33 | 発光素子 |
| 40 | 走査手段 |
| 50 | 駆動手段 |

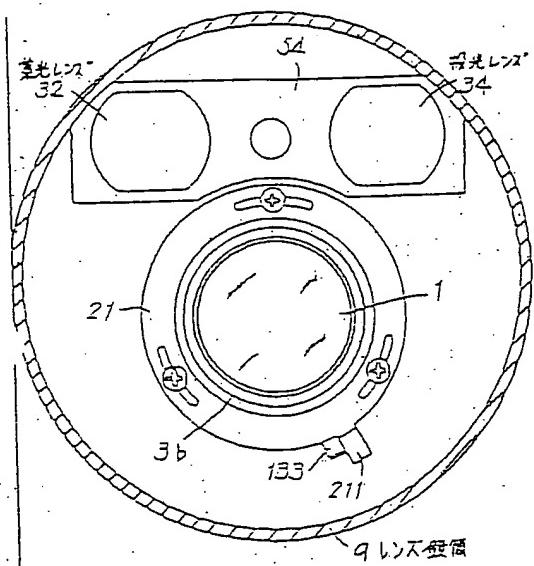
[図1]



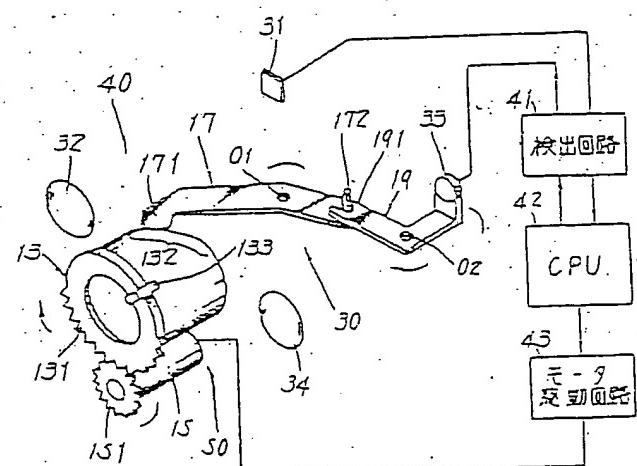
[図2]



[図3]



[図4]



フロントページの焼き。

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[Translation]

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[TITLE OF INVENTION] CAMERA

[SUMMARY]

[Object] It is the object of the invention to miniaturize camera body by securing inside lens barrel a space necessary for containing parts to be contained inside lens barrel while preventing lens barrel from becoming larger.

[Construction] In a camera having a lens barrel 9 capable of advancing and retreating along the optical axis of the photographic lens 1, the central axis extending toward the advancing and retreating direction of the lens barrel 9 is decentered in respect of the optical axis of the photographic lens 1. Parts to be contained inside the lens barrel such as the distance metering optical system 30 are contained in the space expanded as result of decentering.

32

Condenser lens

34

Projector lens

9

Lens barrel

[PATENT CLAIM]

[Claim 1] A camera having a lens barrel capable of advancing and retreating along the optical axis of a photographic lens, wherein the central axis extending toward the advancing and retreating direction of the lens barrel is decentered in respect of the optical axis of the photographic lens.

[Detailed explanation of the invention]

[0001]

[Industrial application of the invention] The present invention relates to a camera having a lens barrel capable of advancing and retreating to the direction of the optical axis of the photographic lens.

[0002]

[Conventional technology] In a conventional camera of this type, a variable focus camera is known wherein the focal length of the photographic lens is changed by changing the extent of extension of the lens barrel in respect of the camera body. In such a variable focus camera, it is so arranged as to make the optical axis of the photographic lens coincide with the central axis of the lens barrel, and parts to be contained inside the lens barrel, such as a diaphragm/shutter or an actuator for focus adjusting mechanism, are contained in the spacing between the outer periphery of the photographic lens and the inner periphery of the lens barrel.

[0003]

[Problems which the present invention intends to solve] In the above-mentioned type of camera, the diameter of the lens barrel has to be made larger in order to expand the space to contain parts to be contained inside the lens barrel; however, the parts to be contained inside the lens barrel are arranged only at a specific position on the outer periphery of the photographic lens; and accordingly, the diameter of the lens barrel has to be made larger only for some parts to be contained inside the lens barrel, and this creates an unnecessary space at positions

where parts to be contained inside the lens barrel are not to be contained. As the lens barrel becomes larger, the enlargement of the drive mechanism for advancing and retreating it to the direction of the optical axis of the photographic lens can not be prevented, and this becomes a great obstacle for making camera body compact.

[0004] It is the object of the present invention to provide a camera wherein the camera body can be made compact by securing inside lens barrel a space necessary for containing parts to be contained inside lens barrel while preventing lens barrel from becoming larger.

[0005]

[Means to solve problems] Explanation will now be made in reference to Fig. 1 showing an example of embodiment. The present invention is applied to a camera having a lens barrel 9 capable of advancing and retreating along the optical axis of the photographic lens 1. And the above-mentioned object can be achieved by decentering the central axis extending to the advancing and retreating direction of the lens barrel 9 in respect of the optical axis of the photographic lens 1.

[0006]

[Operation] A large space suitable for containing the parts 30 to be contained inside the lens barrel can be provided on the side of the decentered direction of the central axis of the lens barrel 9 without enlarging the lens barrel 9.

[0007] Incidentally, in the foregoing paragraphs (Means to solve problems and Operation), an illustration of an embodiment is shown in order to facilitate understanding of the present invention; however, the present invention is not thereby restricted to such example of embodiment.

[0008]

[Example of embodiment] Explanation will now be made of one example of embodiment of the present invention by referring to Fig. 1 to Fig. 4. Fig. 1 to Fig. 4 show one embodiment of the present invention. In Fig. 1 showing a vertical section of the

lens barrel portion, the principal lens 1 made of 3 groups is retained by a retainer barrel 3 wherein a helicoid screw 3a is provided/carved on the outer peripheral part thereof, and the retainer barrel 3 is screwed to the helicoid 51 of the shutter baseboard 5. The shutter baseboard 5 retains the shutter 7 at the rear part 52 of the principal lens 1, and the distance metering optical system 30 to be referred to later is arranged in the retainer member 53 at the upward portion of the principal lens 1.

[0009] Inside the tubular shaped lens barrel 9, the shutter baseboard 5 is fixed in unison therewith, and the helicoid screw 91 which is provided/carved on the outer periphery of the lens barrel 9 meshes with the helicoid screw 111 of the lens barrel transport tube 11 arranged on the outer periphery of the lens barrel 9. The rotation of the lens barrel 9 itself is prevented by a rotation prevention member provided on the camera body (not illustrated), while its movement to the direction of the optical axis is made free, and consequently, as the lens barrel transport tube 11 rotates, the lens barrel 9 moves along the optical axis in association therewith. In other words, movement takes place between the retreated position in short focal length photographic mode (Fig. 1) and the extended position in long focal length photographic mode (Fig. 2). Incidentally, 10 shows a cover.

[0010] There is also provided a coupler ring 13, rotationally movable around the optical axis of the principal lens 1, on the outside of the tubular part 54 of the shutter baseboard 5 on which the retainer barrel 3 is screwed. As shown in Fig. 4, a motor 15 having a gear 151 meshing with the gear 131 formed on the coupler ring 13 is retained by the shutter baseboard 5. Furthermore, a tubular cam 132 is provided on and in association with the coupler ring 13.

[0011] In Fig. 4, the cam follower 171 of the lever 17, made rotationally movable around the rotation center O1 is engaged with the cam 132. At the other end of the lever 17, there is

provided a pin 172 which made to engage with the engagement part 191 of the lever 19 made rotatably movable around the rotation center O2. Here, the coupler ring 13, motor 15, levers 17 and 19 comprise a scanning means 40. Also, the coupler ring 13 has an engagement arm 133 provided in protrusion to the forward direction of the camera, and as shown in Fig. 3, it engages with the engagement arm 211 of the back adjustment ring 21 screwed onto the front plane 3b of the retainer barrel 3, and the rotation of the motor 15 is conveyed to the retainer barrel 3 via the coupler ring 13. The coupler ring 13, motor 15, and back adjustment ring 21 comprise the drive means 50 of the photographic optical system.

[0012] As illustrated in Fig. 1 and Fig. 4, the distance metering optical system 30 is comprised of a light receptor sensor 31 fixed on and retained by the shutter baseboard 5, a condenser lens 32 which condenses reflected light onto the light receptor sensor 31 as will be explained later, a light emitter element 33 fixed onto one end of the lever 19 and a projector lens 34 which projects the exit light from the light emitter element 33 to the direction of a photographic object. As shown in Fig. 3, the condenser lens 32 and the projector lens 34 have a pair of cutouts 32a and 34a on the periphery thereof respectively in parallel. Installation of these cutouts 32a and 34a is helpful in making the retainer member 53 small and enlargement of the diameter of the lens barrel 9 is thereby restrained. In Fig. 4, incidentally, the condenser lens 32 and the projector lens 34 are illustrated in a round shape for sake of simplification.

[0013] Also, as will be clear from Fig. 1 and Fig. 3, the principal lens 1 is mounted with its optical axis downwardly decentered from the central axis of the lens barrel 9. This is helpful in expanding the space for containing the distance metering optical system 30 while preventing increase of the diameter of the lens barrel 9. And the light receptor sensor 31 and the light emitter element 33 are connected to the automatic focus detection circuit 41, the light emitter element 33 is so controlled as to emit

modulated light and distance metering is performed according to the output signal of the light receptor sensor 31.

This detection circuit 41 is connected to the computation processing unit 42 (referred to as "CPU" hereunder), which is connected to the motor drive circuit 43 for controlling the motor 15. Incidentally, the electrical elements of this detection circuit 41, CPU 42, and motor drive circuit 43 are also retained in unison on the shutter baseboard 5.

[0014] The operation of the embodiment thus constructed will now be explained. In short focal length photography, as shown in Fig. 1, the lens barrel 9 is in its recessed position inside the lens barrel transport tube 11, and the focal length is determined by the principal lens 1. As the shutter button (not illustrated) is half-depressed, the motor drive circuit 43 starts working according to a command from the CPU 42, the motor 15 starts its rotation and the light emitter element 33 emits modulated light by way of the detection circuit 41. In Fig. 4, as the motor 15 rotates to the counterclockwise direction, the coupler ring 13 rotates to the clockwise direction and the lever 17 rotates to the counterclockwise direction. As the lever 19 rotationally moves to the clockwise direction in association with the lever 17, the light emitter element 33 also rotationally moves to the clockwise direction, and the photographic object is scanned with modulated light via the light projector lens 34. And the rotation of the motor 15 is conveyed to the back adjustment ring 21 via the engagement arms 133 and 211, the retainer barrel 3 rotates and this causes the principal lens 1 to be extended against the shutter baseboard 5.

[0015] The modulated light projected onto the photographic object is reflected and enters the bi-sectional light receptor sensor 31 via the condenser lens 32. The output from each of the pair of light receptor sensor 31 enters the detection circuit 41, where the signal is processed according to a known method, and the point where the output from each of the light receptor sensor 31 coincides is judged as an in-focus point and a judgment

signal is output to the CPU 42. Thereafter, a motor stop signal is output from the CPU to the motor drive circuit 43 and the motor 15 is stopped. Thus, the extension of the retainer barrel 3 is stopped and the principal lens 1 is controlled and comes into focus according to the distance to the photographic object.

[0016] In succession, according to a drive means (not illustrated), the lens barrel transport tube 11 with the rotating lens barrel 9 is extended to the camera's forward direction along the optical axis, a secondary lens 23 is inserted to the rear optical axis of the principal lens 1, thus enabling long focal length photography as illustrated in Fig. 2. As is clear from Fig. 2, the drive means 50, comprising the principal lens 1 comprising the photographic optical system, the distance metering optical system 30, the scanning means 40 and the motor 15, moves forward in unison, in association with the extension of the lens barrel 9, and hence the relative positional relationship among these elements and systems do not change. In long focal length photography, also, distance metering and focus adjustment are likewise performed as in short focal length photography. In either case of short focal length photography or long focal length photography, it is so optically designed that the amount of extension of the principal lens 1 remains the same in respect of the distance of photography. Consequently, the same cam can be used.

[0017] As has been explained above, according to this embodiment, a necessary space for containing the distance metering optical system 30 is secured inside the lens barrel 9 by decentering the lens barrel 9, the lens barrel can be made compact, in comparison with the conventional example where the lens barrel 9 and the principal lens 1 are brought onto the same axis. As a result of this, the mechanism for advancing and retreating the lens barrel 9 to the direction of the optical axis of the principal lens 1 can also be made compact, and this further makes it possible to make camera body compact.

[0018] According to this embodiment, the distance metering

optical system 30 is contained in the space which is expanded in association with the decentering of the optical axis of the principal lens 1 from the central axis of the lens barrel 9; however, the present invention is not restricted to this embodiment. In case where the distance metering optical system 30 is not to be contained inside the lens barrel 9, other parts to be contained inside the lens barrel, such as the shutter baseboard 5 for example, may be contained inside the space expanded as result of decentering. The present invention can be applied not only in a bifocal length camera, but in a single-focal length camera or three- or more focal length camera, as long as the lens barrel advances and retreats.

[0019]

[Benefits of invention] According to the present invention, as has been explained so far, the central axis of the lens barrel is decentered in respect of the optical axis of the photographic lens, and consequently the camera body can be made compact by securing inside lens barrel a space necessary for containing parts to be contained inside lens barrel while preventing lens barrel from becoming larger.

[Brief explanation of the drawings]

[Fig. 1] Vertical sectional drawing of the front part of the lens barrel in short focal length mode in a camera in one example of embodiment of the present invention.

[Fig. 2] Vertical sectional drawing of the front part of the lens barrel in long focal length mode in a camera in one example of embodiment of the present invention.

[Fig. 3] From view of Fig. 1 seen from the line III-III.

[Fig. 4] Drawing of the periphery of the distance metering optical system 30, including a block diagram of the focal length detection control system.

[Explanation of the reference marks]

- 1 Principal lens
- 3 Retainer barrel
- 5 Shutter baseboard

9 Lens barrel
11 Lens barrel transport tube
13 Coupler ring
21 Back adjustment ring
30 Distance metering optical system
31 Light emitter element
33 Light receptor sensor
40 Canning means
50 Drive means

[Fig. 1]

11
Lens barrel transport tube

9
Lens barrel

30
Distance metering optical system

31 (33)
Light receptor sensor
Light emitter element

40
Scanning means

1
Principal lens (photographic optical system)

3
Retainer barrel

13

Coupler ring

5

Shutter baseboard

21

Back adjustment ring

50

Drive means

[Fig. 2]

23

Secondary lens

[Fig. 3]

32

Condenser lens

34

Projector lens

9

Lens barrel

[Fig. 4]

41

Detection circuit

43

Motor drive circuit

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Fig.1

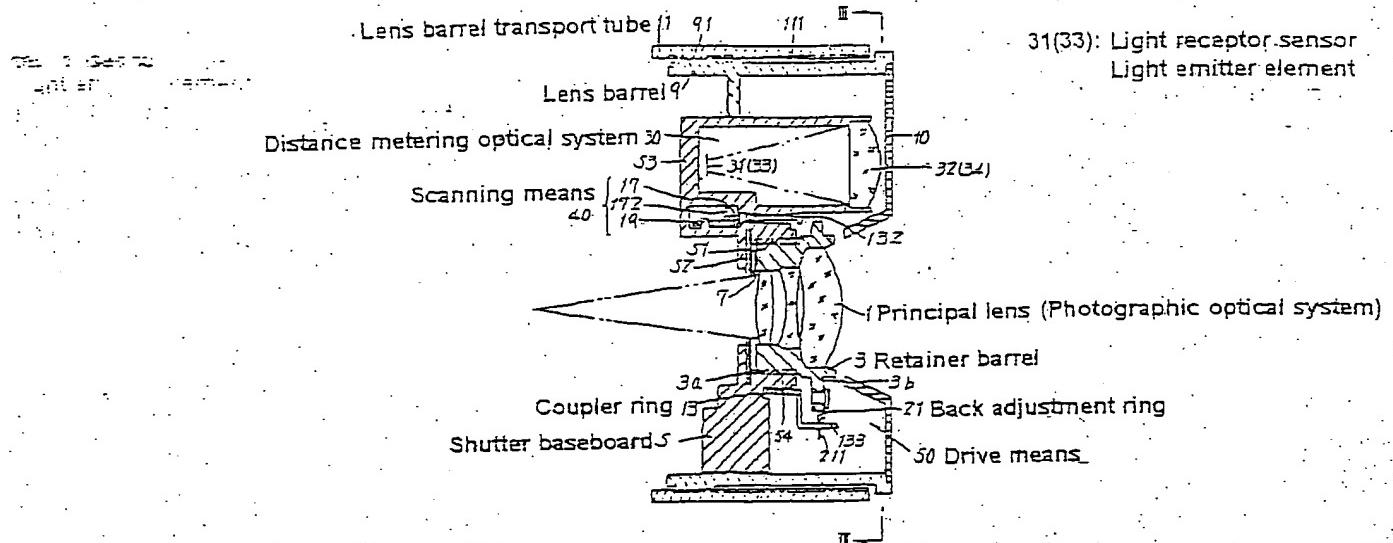


Fig.2

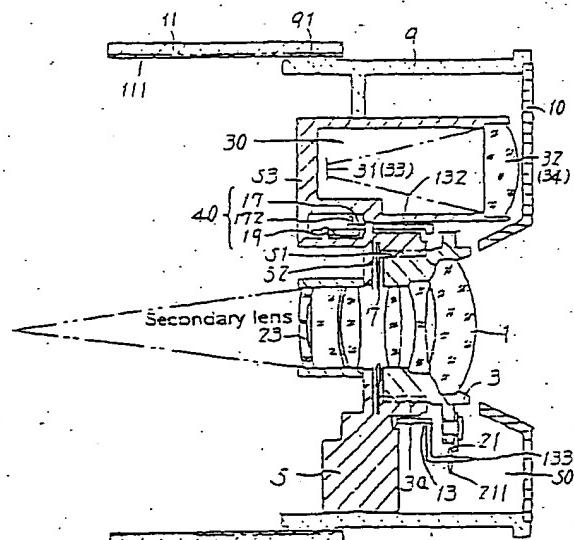


Fig. 3

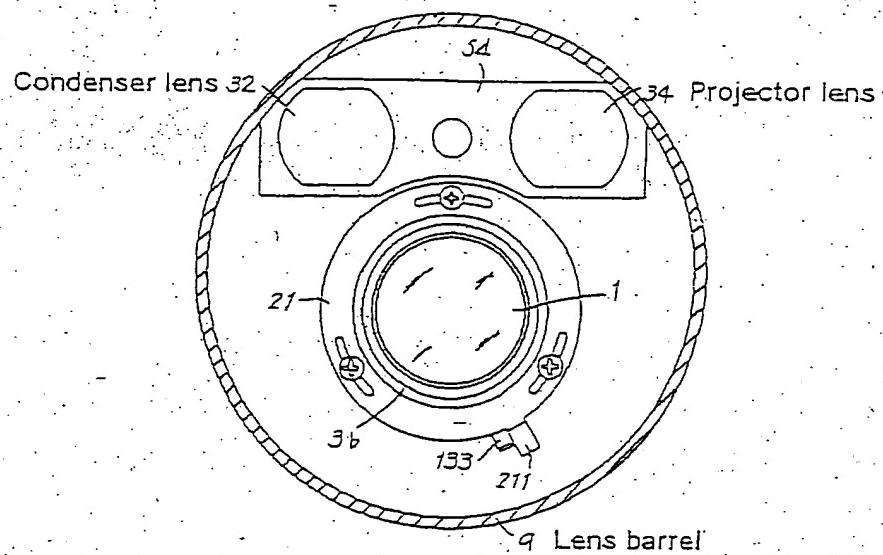


Fig.4

